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THIRD UNITED NATIONS CONFERENCE ON THE EXPLORATION AND PEACEFUL USES OF OUTER SPACE

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Abstract of the paper of the International Astronomical Union

1. Understanding the nature of the universe is one of mankind's oldest and most persistent fascinations. The present century has seen phenomenal progress in all areas of astronomy, from exploration within the solar system to discoveries of the echo of the big bang and vast cosmic explosions occurring even today. Observations from space over the last half century have played a vital role in that breakthrough by enabling astronomers to study the universe at all wavelengths of the electromagnetic spectrum. Conversely, the quest for astronomical knowledge remains a powerful motivation for the continued scientific exploration of space. As the international non-governmental organization uniting professional astronomers worldwide, the International Astronomical Union (IAU) welcomes the initiative by the United Nations to hold the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III) to address the goals, means and guidelines for the continued development of space activities in the first decades of the new millennium. IAU appreciates the opportunity to take part in that important event and thereby offer its assistance and present its concerns for the continued vitality of scientific research in the future exploration and utilization of space.

2. IAU strongly supports the principle underlying the United Nations space treaties that "space is the heritage of all mankind". In the view of the Union, the practical implementation of that ideal comprises at least the following elements: (a) assistance to capacity-building, especially in developing countries, so that all nations may acquire the human resources needed to reap the benefits of basic and applied space science; (b) preservation of the space environment, in all its aspects, so that international scientific research does not suffer unnecessary or undue harm from other activities in space; and (c) free international cooperation in the scientific exploration of space by scientists of all nations. The following briefly outlines the commitments and concerns of IAU in each of those areas.

I. Capacity-building in astronomy and basic space science

3. The key need for any country to participate profitably in the space enterprise is simple: a resource of well-educated scientists and engineers, employed in the service of their country and with the tools to put their ingenuity and experience to good use. While astronomy is but one in the wide spectrum of necessary skills, the immediate fascination of astronomy for bright young minds is a proven, effective means to attract them into a science education. And modern astronomy education equips graduates with experience in scientific reasoning and method as well as with skills in mathematics, physics and computation, including image-processing techniques, which qualify them for a wide range of careers in applied as well as basic science.

4. IAU conducts a range of capacity-building programmes in developing countries that cover the development of astronomy as a paradigm of science education, from the formation of high school teachers over the development of university undergraduate and graduate courses to support to exchange programmes for isolated staff scientists. IAU applauds the United Nations' initiative, as a follow-up to the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space, held in 1982, to establish regional educational centres for space science and technology. IAU, in collaboration with the Committee on Space Research (COSPAR), proposes to enhance the attraction of the United Nations centres to young people by offering a component of astrophysics and basic space science to the curricula of the centres, creating a synergy between the complementary capabilities of professional non-governmental organizations and those of the United Nations system. An IAU-COSPAR-United Nations Special Workshop on Education is to be organized during UNISPACE III to discuss those possibilities.

II. Preserving the space environment

5. The accelerating development of activities in space is leading to a rapidly increasing deterioration of the space environment. Because of the extreme faintness of cosmic sources and the great sensitivity of astronomical observations, astronomers are the first to feel the negative impact of that development, but the signs are clear: space is another natural resource once believed to be infinite that is showing inexorable symptoms of overexploitation. Maybe "only" science will suffer at first, but it will not be alone for long.

6. The most serious immediate threat is the dramatic increase in radio frequency interference at all frequencies, mainly as a result of the rapidly increasing demands of the space telecommunications industry for more frequency space: an ordinary portable telephone, if placed on the Moon, would be one of the brightest sources in the radio astronomical sky! Communications from scientific satellites in other disciplines are also now being threatened, however. International agreements are needed, as a matter of urgency, to ensure protection of the key frequencies for radio astronomy and to promote the adoption of technical measures to reduce the levels of sideband emissions from communications satellites outside their allocated wavelength bands.

7. Space debris is another ever-increasing hazard to both scientific satellites and ground-based astronomical observations. IAU appreciates the initiative taken by the Committee on the Peaceful Uses of Outer Space to commission a comprehensive study of those issues and to formulate recommendations for preventive measures that can and should be taken by space agencies, whether public or private, to avert an exponential growth of the problem.

8. A third threat to the space environment is presented by recurrent plans to launch very luminous objects into space for solar illumination or energy transmission, or for artistic, celebratory or commercial advertising purposes. Projects have been proposed, some reaching the experimental stage, that would have illuminated the Earth with an intensity several times that of the full Moon. Such displays could cause not only the demise of ground-based extragalactic astronomy and cosmology, but also a violation of the aesthetic, natural or religious values of nations worldwide. No regulations currently prevent the launch of such experiments by non-national agencies. IAU urgently appeals to the nations of the world, through the Committee on the Peaceful Uses of Outer Space, to subject projects of a potentially harmful nature to prior international consultations before it is too late.

9. Finally, the danger that future space missions to bodies of the solar system might pollute them irreversibly is of strong concern to the IAU and COSPAR. Better international guidelines

for the prevention of planetary pollution in its many forms are needed and the Committee on the Peaceful Uses of Outer Space is the forum in which to discuss such measures.

III. Global cooperation and communication

10. The rapid, worldwide communication, dissemination and coordination of scientific discoveries is of key importance in many branches of astronomical research and is one of the main tasks of IAU. Results are not only of purely scientific, but also sometimes of practical significance, as two examples will show.

11. Firstly, international cooperation in the collection, collation and interpretation of observations of near-Earth objects is essential for early assessment of the tiny, but real risk of a potentially devastating impact in the foreseeable future and to refine the precise computations needed for any mitigation measures in case a significant danger of an impact were to be substantiated. IAU is working with observers and agencies worldwide to optimize scientific methods and to implement appropriate warning procedures for research on near-Earth objects. Secondly, astronomers observing with spacecraft have charted the amount of light being scattered uselessly into space from poorly designed lighting fixtures on the ground. The growing light pollution makes increasingly large areas of the Earth unusable for astronomical observations, but the light visible from space also represents wasted energy for hundreds of millions of dollars and is beginning to have a negative impact on the environment in densely populated areas. IAU-sponsored meetings, such as the IAU-COSPAR-United Nations Special Environmental Symposium to be held at UNISPACE III itself, help to identify such negative effects and to promote simple, cost-effective energy conservation measures benefiting laymen and astronomers alike.
